RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report



**Log Event** A

**Borehole** 51-14-04

## Borehole Information

| | | |
|---|---|---|
| **Farm :** TX | **Tank :** TX-114 | **Site Number :** 299-W15-115 |
| **N-Coord :** 41,950 | **W-Coord :** 75,809 | **TOC Elevation :** 670.75 |
| **Water Level, ft :** | **Date Drilled :** 9/30/1970 | |

**Casing Record**

| | | |
|---|---|---|
| Type : Steel-welded | Thickness : 0.280 | ID, in. : 6 |
| Top Depth, ft. : 0 | Bottom Depth, ft. : 100 | |

**Borehole Notes:**
According to the driller's records, this borehole was not perforated or grouted. The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing. The top of the casing, which is the zero reference for the SGLS, is approximately 6 in. above the tank farm grade.

## Equipment Information

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|---|---|---|
| **Logging System :** 2 | **Detector Type :** HPGe | **Detector Efficiency:** 35.0 % |
| **Calibration Date :** 10/1995 | **Calibration Reference :** GJPO-HAN-3 | **Logging Procedure :** P-GJPO-1783 |

## Log Run Information

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|---|---|---|---|---|---|
| **Log Run Number :** 1 | **Log Run Date :** 2/7/1996 | **Logging Engineer:** Gary Lekvold |
| **Start Depth, ft.:** 97.5 | **Counting Time, sec.:** 100 | **L/R :** L | **Shield :** N |
| **Finish Depth, ft. :** 47.0 | **MSA Interval, ft. :** 0.5 | **Log Speed, ft/min.:** n/a |
| **Log Run Number :** 2 | **Log Run Date :** 2/8/1996 | **Logging Engineer:** Gary Lekvold |
| **Start Depth, ft.:** 48.0 | **Counting Time, sec.:** 100 | **L/R :** R | **Shield :** N |
| **Finish Depth, ft. :** 43.0 | **MSA Interval, ft. :** 0.5 | **Log Speed, ft/min.:** n/a |
| **Log Run Number :** 3 | **Log Run Date :** 2/8/1996 | **Logging Engineer:** Gary Lekvold |
| **Start Depth, ft.:** 44.0 | **Counting Time, sec.:** 100 | **L/R :** L | **Shield :** N |
| **Finish Depth, ft. :** 0.0 | **MSA Interval, ft. :** 0.5 | **Log Speed, ft/min.:** n/a |
| **Log Run Number :** 4 | **Log Run Date :** 2/8/1996 | **Logging Engineer:** Gary Lekvold |
| **Start Depth, ft.:** 25.0 | **Counting Time, sec.:** 100 | **L/R :** L | **Shield :** N |
| **Finish Depth, ft. :** 10.0 | **MSA Interval, ft. :** 0.5 | **Log Speed, ft/min.:** n/a |

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## Analysis Information

Analyst : S.D. Barry

Data Processing Reference : P-GJPO-1787 Analysis Date : 12/16/1996

**Analysis Notes :**

This borehole was logged in four log runs with one section relogged for quality assurance purposes. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from these spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The only man-made radionuclide detected in this borehole was Cs-137. The presence of Cs-137 contamination was measured almost continuously from the ground surface to about 97.5 ft (total depth logged). A region of high dead time was encountered between 45 and 46.5 ft. The maximum measured Cs-137 concentration was 1,843 pCi/g at 47 ft. However, higher concentrations are likely because the detector became saturated and radionuclide concentrations could not be calculated between 45 and 46.5 ft.

Zones of interest on the Cs-137 plot are from 2 to 5 ft, 7.5 to 9 ft, 18 to 22 ft, 42 to 50 ft, 60 to 62 ft, 80 to 83 ft, and 90 to 97.5 ft.

Measurable K-40 concentrations increase at about 47 ft.

The interval between 10 and 25 ft was relogged to check the quality of the radionuclide concentration measurements made by the SGLS. The concentrations of the man-made and natural radionuclides were calculated using the separate data sets at the overlapping depths. The concentrations of these radionuclides were within two standard deviations (2-sigma or 95% confidence interval) indicating acceptable repeatability of the intensity of gamma-ray energy used in the calculation of radionuclide concentration measurements.

The historical gross gamma log data analyzed for this borehole were obtained using a shielded scintillation probe.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks TX-113 and TX-114.

**Log Plot Notes:**

Separate log plots show the man-made (Cs-137) and the naturally occurring radionuclides (KUT). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

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Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A rerun plot was created for the region between 10 and 25 ft. The radionuclide concentrations were calculated using the separate data sets provided by the original and rerun logging runs.

A time-sequence plot from May 1980 to June 1987 was created from historical gross gamma log data.